No.10　Circulation System of the Earth

“I-Ro-Ha Song” is Japanese alphabet song, similar to the ABC song and the lyrics are as follows;

I- ro-ha ni-ho-he-do chi-ri-nu-ru-wo
Wa-ga-yo ta-re-zo tsu-ne-na-ra-mu
U-i-no o-ku-ya-ma ke-fu-ko-e-te
A- sa-ki yu-me-mi-ji (shi) yo-hi-mo-se-zu”
(Through fragrant, these flowers shall die soon,
Who could remain unchanged in this world?
We cross the mountain of vicissitude today.
Life like a light dream intoxicates us no more.)

This is a masterpiece song because 47 Hiragana characters are used once for each in this song. There are two ways of reading and interpretations. If we read as “A-sa-ki-yu-me-mi-ji,” in which the last letter has a voiced sound, the meaning of the song will be as “This world is changing all the time and all that prosper must decline. Nothing exists which is not uncertain in this world. Now I realized this reason of uncertainty. Therefore, I will not be at a loss what to do without getting drunk from now on.” This describes the self-awareness of human’s own growth and implies his/her forward-looking attitude. On the contrary, if we read as “A-sa-ki-yu-me-mi-shi,” in which the last letter has a voiceless sound, the song will have the different meaning as follows, “I looked back my past when I realized the reason of uncertainty. I thought I did not get drunk and was in my right mind. But the truth was, I was in the middle of confusion. After all, it was just a dream.”

This interpretation is emotional and impressive, which slightly differs from the former one’s interpretation. Although the latter one with the voiceless sound is commonly known, the former interpretation is considered to be the original one (Tyougoro Kaionji).

Moreover, there is a Japanese word of “Seisei-ryuten, Rinne (transmigration and incarnation),” which is similar to the word that a Greek philosopher Herakleitos left “Panta rei,” or “everything is changing.” Our ancient intellectuals and philosophers might have known intuitively that everything would be changing and circulating through the observation of nature including human beings, although there was no scientific evidence.

The earth is divided into four sphere areas, which are atmosphere, hydrosphere, biosphere (or landsphere?), and lithosphere. Before human beings appeared on this land, all materials had circulated among the four sphere areas. They were well balanced in their quantities in each area and there was no change in their total amount, as well as the carbon circulation which has been introduced in the previous article in the *Eco News*. Carbon exists in the form of fossil fuels in the lithosphere, which is accumulated in the atmosphere with the form of carbonic acid gas after the combustion of fossil fuels. This is because it is much faster - more than 10 to 100 thousand times - that carbon is discharged to the atmosphere from fossil fuels through combustion than carbonic acid gas absorbed and solidified from the atmosphere.

Organisms have formed the bio-ecosphere, existing in each sphere area, sometimes in more than one area, with a variety of forms. However, after the human beings' emergence, they manipulated the nature and formed an "anthroposphere," which is convenient for human beings to live. The formation of the anthroposphere is considered to be about four thousands years ago, when the agriculture started, and is overlapped to four sphere areas, as well as the bio-ecosphere. The current global environmental problem occurred through diverse activities of human beings which imposed a burden to the four sphere areas and bio-ecosphere and destroyed the material circulation systems among those areas.

It is considered that in the global systems each material is influenced and transformed through three types of circulation systems. The first one is a "geological circulation," or the gradual and long-time circulation (by Hiroshi Mizutani). This circulation is processed through rock formations, such as crustal movements, weathering, metamorphism, melting, and solidification. Physical and chemical processes mainly control this circulation with a more-than-10 million-year cycle. An enormous amount of materials is stored underground, which is formed through the long time of processes. For example, the sedimentary rock is formed through accumulation of weathered materials in the seabed, which is transformed to mineral resources by the magmatic energy. The cycle of these processes is about 350 million years – the lifetime of sedimentary rocks. Underground resources, such as minerals and fossil fuels, are the resources that were formed through this long and gradual circulation. Those resources had been formed in hundreds-of-million-year history of the earth and human beings cannot reproduce them although they make full use of

scientific technologies. Therefore, it is impossible to replicate those resources.
The second circulation system is the circulation of elements in the water or the air, such as hydrogen, carbon, nitrogen, oxygen, and sulfur. This circulation is supported by the bio-ecosphere and called “biochemical circulation,” or the quick and short circulation. In this circulation system, plants produce organic matters using the solar energy. Organic matters are decomposed to inorganic matters by animals and bacteria. Inorganic matters then are transformed to organic matters by plants. Thus those materials circulate. The solar energy plays a main role to function this circulation and its cycle is less than a thousand years, which is comparably short. Therefore, it may be possible for human beings to replicate this circulation using the solar energy.
The first and the second circulation systems are formed through the long period of time. To make their livings, human beings have obtained resources from these circulation systems and relied on them. The important thing is that those circulation systems essentially function without human beings’ intervention.
The third circulation belongs to the anthroposphere, which is called “sociochemical circulation,” or the very quick and short circulation. Materials produced in the anthroposphere (i.e., man-made materials, products, and wastes) are included in this circulation system. Its cycle is considered about 10 years, but this system has not been completely established. Because of that, materials that overflew from this circulation system were accumulated in the four sphere areas such as the atmosphere, which confuses the material circulation systems.
Especially, the greenhouse effect causes the increase of carbon acid gas in the air due to a big amount of consumption of fossil fuels and qualitative changes of heat balance. Throughout the history of the earth, organisms that have influenced qualitative changes of the global system were the ancestors of algae by modifying the atmospheric composition in billions years ago. Human beings are now rapidly moving toward a turning point, anticipating that qualitative changes would bring about the collapse.

Currently, it is declared we should create the recycling society. It may be more important to establish the recycling system in the anthroposphere (the venous industry). Although business conditions will not constantly develop if we establish the recycling system, this will be a solid economical strategy for the next generation in the long. Therefore, it is important for us to establish a sustainable economy system

in which the value of nature environment is added to the price of products (eco-business system). It also will be important for all human beings who support this system to reconsider and reform their thought and idea.

- Statistical Information: References-

Pathological symptoms on the biosphere (Extracted from “Limit of the Earth” by Hiroshi Mizutani, 2000)

1. 40 – 50 % of net production of the land-ecosystem has been already used for human beings
2. It is necessary to spend 1.4 tons of water to produce 1 kg of grain. 54 % of usable fresh water has already been used by human beings.
3. 1 kl. of oil (petrol) is consumed annually to cultivate 1 ha. of the land.
4. Annual food production per person has decreased for the last 15 years.
5. Despite the remarkable development of fishing industry, the amount of a fish catch has not increased for the last 15 years.
6. Human’ activities directly influenced the acceleration of specie extinction, which is 100 to 1,000 times faster than that of the pre-human period.
7. The density of the greenhouse effect gas in the air is increasing during the last half of the 20th century.
8. The amount of lead flow is 17 times as before human beings started production activities and 21 times in nickel.
9. The amount of sulfur and nitrogen flown from human beings’ activities is more than that from the biosphere (i.e., three times in sulfur).

“Illness exists in poverty, so does in richness” (extracted from “World Watch,” 6/7 2000)

Annual expenditure of military actions of the world related to border issues, rights/interests, and conflicts in 1995 … $ 864 billion (In the sum total, 23 million people have died since 1945 because of those military actions)

Annual expenditure related to the prevention and control of Aids, tuberculosis, and malarias … $ 15 billion (In the sum total, 150 million people have died since 1945 because of those diseases)

The number of medicines developed from 1975 to 97 against the disease of living

habit in advanced countries, such as luxury and overeat … 1223 cases

The number of medicines developed from 1975 to 97 against the mortal in development countries, such as malaria schistosomiasis, and other tropical diseases … 13 cases

1.1 million people die annually for malaria:

Cost to reduce by half … $ 1 billion

Estimated cost of annual sales (1999) of Viagra by Pfizer Inc. … $ 1 billion